# UNIVAC

## *fac-tronic system*

as used by

## THE ARMY MAP SERVICE

*CORPS OF ENGINEERS*
*Department of the Army • Washington, D. C.*

The Army Map Service, Corps of Engineers, Department of the Army, will use its UNIVAC primarily to perform computations in connection with processing a mass of numerical geodetic position data to usable form suitable for modern military operations of the Armed Services. These computations will give the Universal Transverse Mercator grid coordinates and the geographic coordinates of geodetic control stations throughout the world. Mathematical operations will include the adjustment of these points to a common geodetic datum, the transformation to the standard plane coordinate system, the adjustment of nets of triangulation involving the solution of large sets of simultaneous equations, computation of long geodetic lines, reduction of occultation and eclipse data, isostatic and gravity reductions, shoran net adjustments, and computations which will lead to a redetermination of the size and shape of the earth.

## the unityper

The UNITYPER is for transcribing written documents to magnetic tapes and is operated from a keyboard. A monitoring system maintains accurate key stroke count and supplies fill-in characters automatically.

Speed—
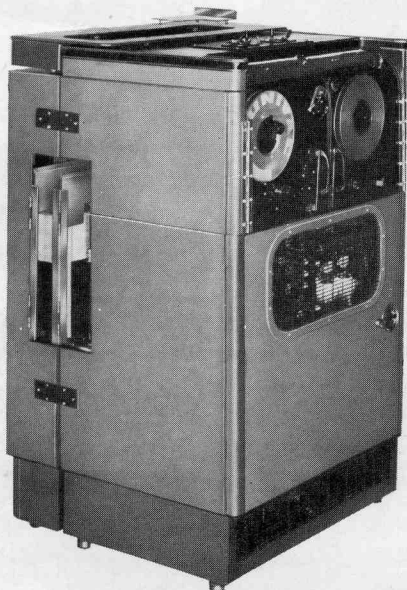   Normal typing rates
   automatically controlled: 20 characters per second.

Power requirements—
   800 watts, 110 volts, 60 cycle AC including printer dolly.

## the card-to-tape converter

The CARD-TO-TAPE CONVERTER transcribes punched-card data into magnetic tape recordings for immediate use with the CENTRAL COMPUTER.





# The Central

The CENTRAL COMPUTER is the "brain" of the system. formed within the one unit. The CENTRAL COMPUTER is UNISERVOS. The SUPERVISORY CONTROL console, associat of the system. It provides a continuous picture of oper at any time.

MODE OF OPERATION—Completely automatic, controlled by programs consisting of instructions listed in UNIVAC INSTRUCTION code.

INTERNAL OPERATIONS OF UNIVAC—

   Memory
      Capacity: 1,000 words, 12,000 characters
      Construction: 100 mercury channels
                    10 words per channel
      Access time: *minimum 40.4
                   *maximum 404 microseconds
                   *average 222

   Basic pulse rate: 2.25 megacycles

# Space Requ

A typical installation takes a space 25′ x 50′ with a hei allows for room for a UNIVAC with its associated power UNISERVOS, a UNITYPER, a UNIPRINTER, storage cabinets

# Computer

All arithmetic, logical, and control functions are per-
directly connected to and can control as many as ten
ed with the CENTRAL COMPUTER, is the "nerve center"
ation and permits human intervention for any reason

Word length: 12 characters; 7 pulses per char-
acter

91 pulses (including space between
words = 7 pulses).

Addition-Subtraction: 525 microseconds.**
Multiplication: 2150 microseconds.**
Division: 3890 microseconds.**

*Including transfer time.*
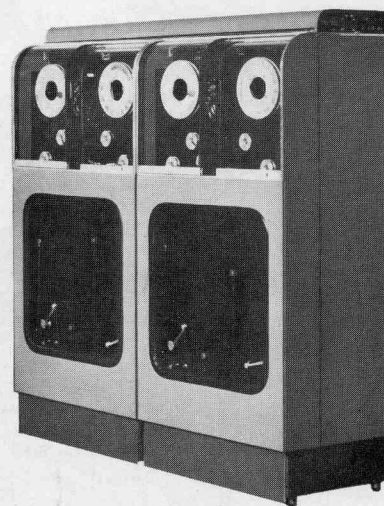**All times shown include time for obtaining instruction
and operand from memory.*

POWER REQUIREMENTS—
Approximately 123 kilovolt-amperes at 0.96
power factor.

## irements

ht of at least 10′ and sufficient under floor area. This
upply and SUPERVISORY CONTROL console, six to eight
and several executive desks.

## the uniservo

The UNISERVO moves magnetic tape in either direction across
the reading-recording head under the automatic control of
the CENTRAL COMPUTER. One UNISERVO may read, and an-
other record simultaneously while the CENTRAL COMPUTER
is carrying out further computation.

Reading and Recording on Tape—
input block size: 60 words, 720 characters
tape width: ½ inch, 8 channels
tape length: 2000 blocks per reel
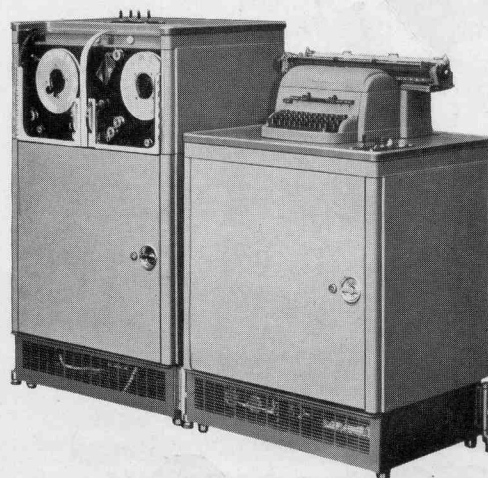input-output rate: 12,850 digits per second (instantaneous
rate)

## the uniprinter

The UNIPRINTER translates magnetic tape data to printed
form. All standard typewriter symbols are available.

Speed—
10-12 characters per second.

Power requirements—
805 watts, 110 volts, 60 cycle AC including printer dolly.

## ACCURACY

For any equipment designed to be used in solving complex mathematical and commercial problems, accuracy of results is a prime requisite. In Univac all circuits and registers used in arithmetic operations are in duplicate. Every operation is performed simultaneously by two independent sets of equipment, while comparison circuits automatically examine every level of performance to make certain of agreement. Any discrepancy is instantaneously detected, the Univac halts all operation, and the control panel indicates the location and type of fault.

## AUTOMATIC

The Univac accepts its instructions for a particular problem from the same type of tapes that supply the problem data, and at the same speed. These instruction tapes are prepared in advance and can be called upon whenever required. Because of this, the amount of setup time required to prepare the computer to begin a particular problem is negligible. No cables have to be plugged in or switches set. Essentially, setup time has been reduced to the time required to mount a reel of tape on the tape-feeding equipment — a matter of one half a minute or so.

## ALPHABETIC-NUMERIC

In designing a computing system which is to be truly universal in applications the ability to handle alphabetic as well as numeric data is absolutely essential. Many record-keeping or accounting applications require the utilization of proper names or descriptive phrases. The Univac can manipulate all characters found on the keyboard of a standard typewriter.

## SPEED

The rate at which data can be introduced into a high-speed computer has in the past made it impossible to utilize fully the speed of the internal computer. In the Univac, a 1500 foot reel of narrow magnetic metal tape has been adopted as the recording medium, to be used for the recording of source data to be processed by the computer and to receive the results which the computer reads out. Each character is represented on this tape by invisible magnetic spots. These letters or numbers, once recorded on tape can be introduced into the computer at a rate of 12,850 per second through the use of special tape-feeding equipment. This is the equivalent of reading 9,636 punched-cards, punched in every column, in one minute. Similarly, the tape can accept the answers from the computer at the same rate of speed. Thus the magnetic tape becomes a recording medium which matches the speed of electronic computing.